Questions & Answers Session 2

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Melanie Follette-Cook (melanie.cook@nasa.gov) or Pawan Gupta (pawan.gupta@nasa.gov).

Question 1: How does GOCART deal with secondary organic aerosols?
Answer 1: In the version of GOCART running in GEOS FP, secondary organic aerosols are not simulated. A future update of GEOS FP will include an update to GOCART that includes the new Brown Carbon (BrC) tracer, as well as secondary organic aerosols (SOA). Anthropogenic SOA from oxidation of VOCs are calculated by scaling the CO emissions that result from biomass burning and anthropogenic CO emissions. Biogenic SOA are calculated by the MEGAN (Model of Emissions of Gases and Aerosols from Nature) biogenic model.

Question 2: The models have defined vertical levels (viz 900hpa, 850hpa ,200hpa etc.). However the satellite AOD (MODIS for example) gives us the total column value. I want to know, what is the range of this column in hpa (e.g. 1000hpa to ? hpa)?
Answer 2: AOD, or any other column quantity, reflects the total amount from the surface to the top of the atmosphere.

Question 3: Can you please mention the approximate time to release the BrC scheme in GOCART/MERRA2?
Answer 3: The brown carbon (BrC) tracer will be in the next update to FP, probably within the next six months to one year. MERRA-2 will not contain BrC. Future long term reanalysis from GMAO likely will.

Question 4: This is more a question of interpolation, data fusion and machine learning, but do you know any simple models that have satellite and in-situ sensor data as input and that can be applied in a small area? And if this same model can be applied later in other areas that do not have in-situ sensors.
Answer 4: See the MERRA-2 case study at the end of the webinar. You can definitely calculate a simple model, or train a more complicated machine learning model using observations and model output that can then be applied to areas without observations.

I would caution against applying the resulting algorithm in different regions or in different time periods though.

Question 5: Can you please give your remark on a possible way to validate (local and regional level) aerosol mass simulated by reanalysis data?
Answer 5: Reanalysis output of aerosol mass can be validated using available ground observations. More generally, reanalysis output can be validated using any observations that were not assimilated.

Question 6: What are the model inputs for anthropogenic SO2 and SO4 emissions? I noticed that (monthly) emissions data didn't change in recent years, when comparing data through panoply.
Answer 6: Currently SO2 emissions come from the HTAP emissions inventory, which is valid for the year 2010 and therefore does not reflect reductions in SO2 emissions that have occurred over the last decade. HTAP emissions are also supplemented by SO2 observations from OMI. A future update to FP and CF will include a switch to the Community Emissions Data System (CEDS) emissions inventory, which will include recent reductions in SO2 emissions.
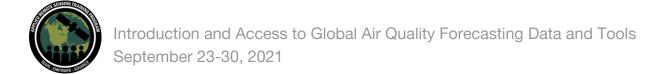
Question 7: Is it possible to measure CO2 with a remote sensing?
Answer 7: Yes, several sensors in orbit measure CO2, (e.g. OCO-2), but I'm not an expert in that area of remote sensing.

Question 8: Are the historical and forecasted data available in excel format?
Answer 8: I don't think you can download the gridded data in csv or xls format, but the cf_map site will allow you to download the time series data in ascii, JSON, or .xlsx format.

Question 9: The website https://fluid.nccs.nasa.gov/cf_map/ is down for me (Internal Server Error). Is there maintenance being performed?
Answer 9: Yes, there's an issue with the latest run of GEOS-CF. This will hopefully be fixed by later today.

Question 10: Which GMAO product do you recommend to study aerosols (past data) over south Asia?

Answer 10: This will likely depend on the length of time needed and the application. If looking for a relatively consistent time series over a long period of time, then MERRA-2 will be best, but if focused on speciation on shorter time scales (since 2018) than the GEOS-CF replay would also be a good resource (reminder - MERRA-2 does not contain nitrates or SOA).

Question 11: Are there some collections or datasets with pollen information?
Answer 11: GEOS does not represent pollen within its collections. I'm sorry, I don't know of any pollen datasets.

Question 12: which type of data is more accurate, analysis or reanalysis?
Answer 12: One isn't necessarily more accurate than the other. A reanalysis represents the creation of analysis fields over a period of time using a consistent data assimilation system and a consistent forecast model.

Question 13: Any comments on COVID19 and GEOS model forecasts?
Answer 13: The lockdowns that resulted from the COVID19 pandemic resulted in lower emissions of many pollutants. These changes won't be reflected in AQ forecasts because these changes were sudden and not included in the emissions inventories that these models use. Adjusting emissions inventories to account for these changes is an active area of research.
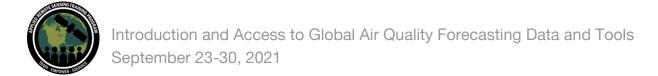
Question 14: Is it possible to downscale with wrf-chem using GEOS-CF as initial conditions?
Answer 14: Yes. If you're using the 2018-present replay period available from GEOS-CF, it could be an example of a consistent dataset that can be utilized for downscaling.

Question 15: What are the major differences between GEOS and MERRA-2 in the context of an aerosol module?
Answer 15: The primary difference between the version of the GOCART aerosol module in GEOS FP and MERRA-2, is that the version run in FP contains nitrates, and the version run in MERRA-2 does not. There are also differences in the AOD assimilation, MERRA-2 uses 3DEnVar, and FP uses Hyb-4DEnvVar.

Question 16: is there an restful api to access that data to get it per http request without using the webpage and without downloading it

Answer 16: Go to the GMAO website to find more information about this topic. You can also send an email to geos5-nrt@lists.nasa.gov with questions about product accessibility.